GREAT BARRIER REEF
MARINE PARK AUTHORITY

Water Quality Management for Marine Protected Areas

A CHALLENGE FOR THE GREAT BARRIER REEF MARINE PARK AUTHORITY

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GREAT BARRIER REEF
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Great Barrier Reef Water Quality-Gains, Pains and Lessons

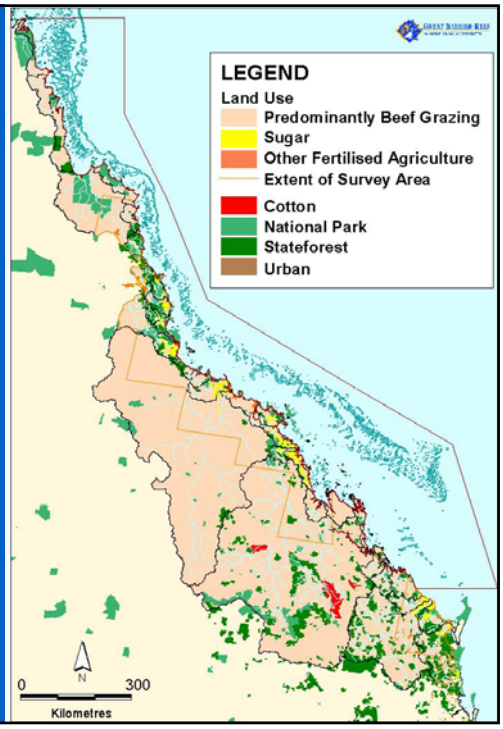
Manager
Water Quality & Coastal Development

What is the GBRWHA?

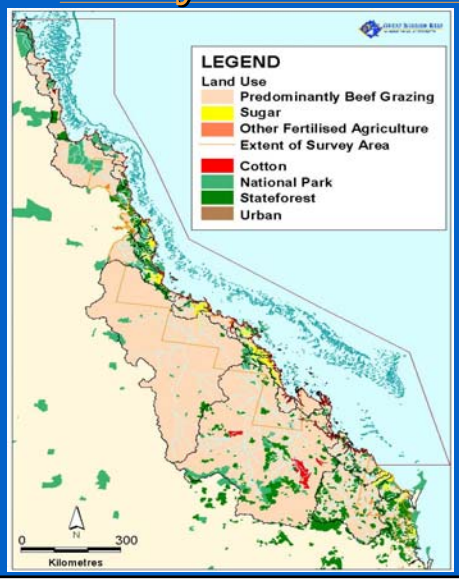
- The Great Barrier Reef World Heritage Area :
  - Covers an area of approx 350,000km^2.
  - The largest World Heritage Area in the World (listed in 1981).
- The GBRMPA is the lead agency for the care and protection of the GBRWHA.

GBR Catchment land use

The GBR catchment is the principle source of pollutants to the GBR



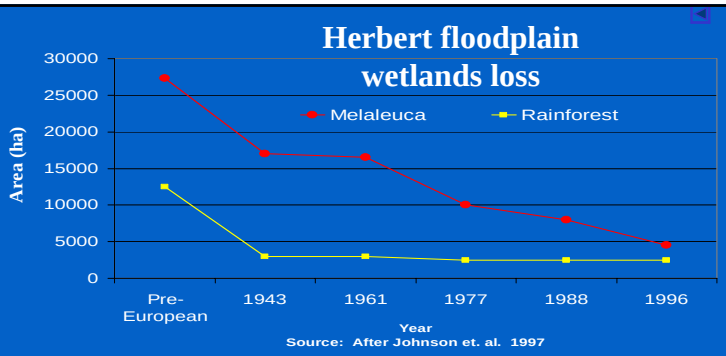
GBR catchment extensively modified

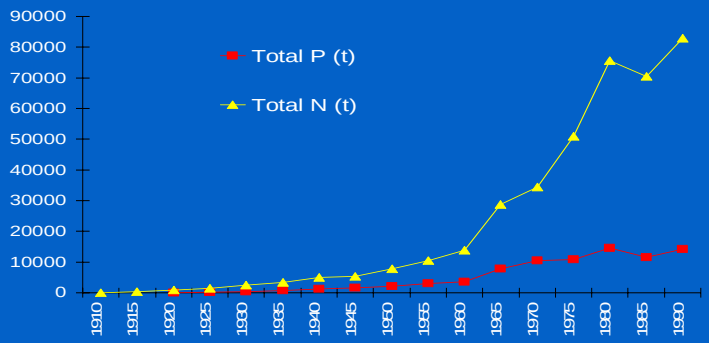


Connectivity in the GBR

(from R Kelley & ACRS)

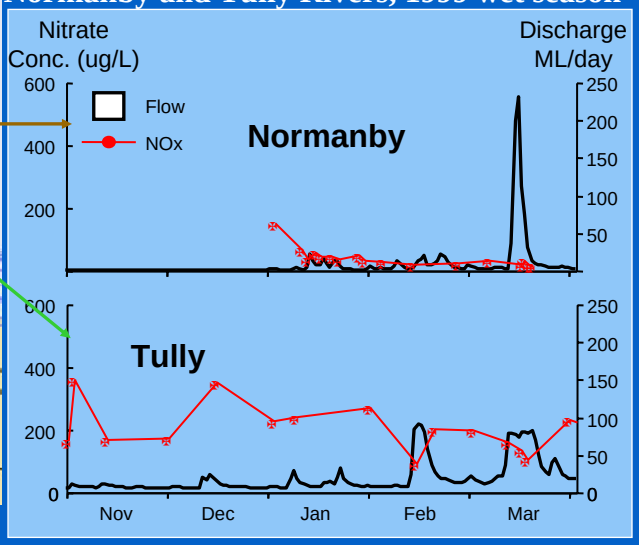
Land use trends





Catchment fertiliser use

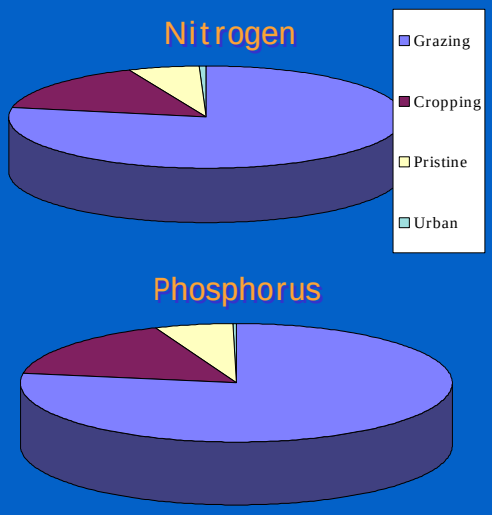
Comparison between lower catchments in Normanby and Tully Rivers, 1999 wet season

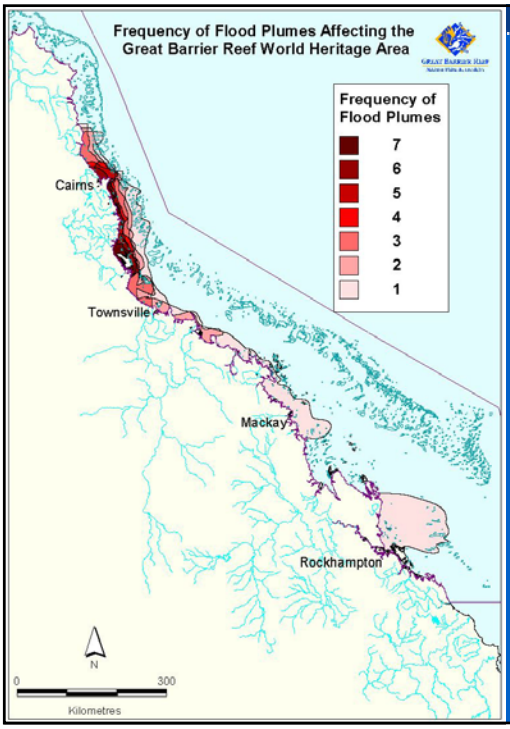


Conclusion: High levels of nitrate in rivers draining fertilized compared to unfertilized catchments

Nutrient and sediment inputs

- Sediment loads to the GBRWHA increased by 3-9 times
- N loads increased by 2-4 times
- P loads increased 3-15 times





Nutrient and Sediment Inputs

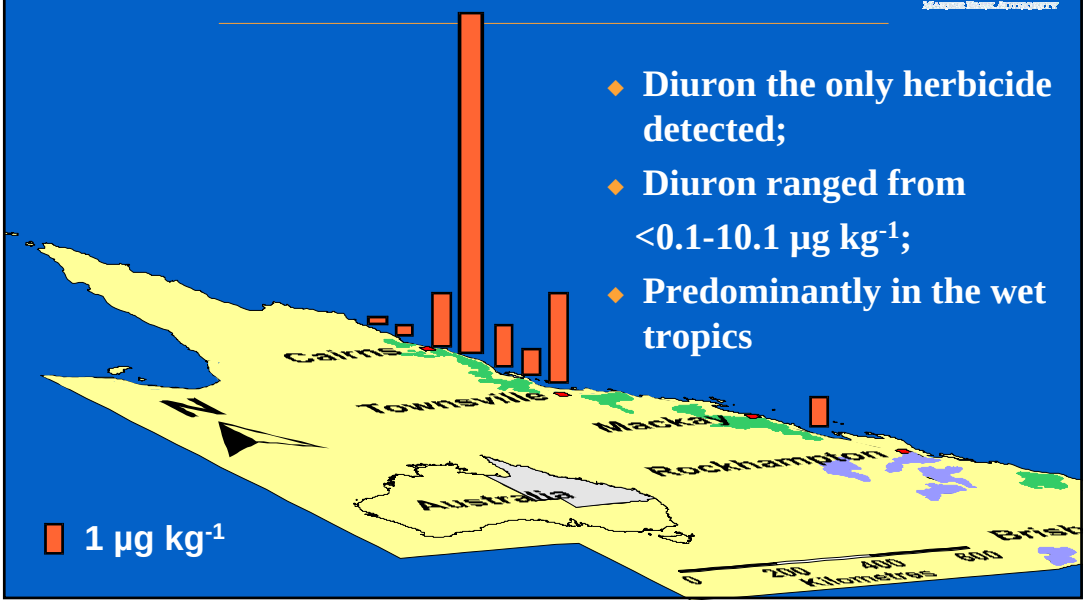
Frequency of flood plumes - overlay for 1990 to 2000

Effects on reefs

- Flood plumes
- Nitrate concentrations exceed the 'effects levels' for nitrate on coral for periods of days to weeks

Subtidal diuron concentrations

- Diuron the only herbicide detected;
- Diuron ranged from <0.1-10.1 µg kg^{-1};
- Predominantly in the wet tropics



Combination of Impacts

- Combination of bleaching, COTS and runoff and concerns of increasing frequency of these events
- Combination of impacts of sediments, nutrients and toxic chemicals
- Sediment and nutrient enriched run-off may inhibit the recovery of coral populations after disturbance

A Brief History of Queensland Government Initiatives

February 2001-

- Qld Govt announce a policy to develop a Reef WQ Protection Plan in recognition of polluted water entering the GBRWHA from adjacent catchments (election platform).

June 2001-

- Qld Govt establish a Reef Taskforce to make recommendations on a Reef WQ Protection Plan to the Qld Cabinet.

December 2001-

- The Qld Govt agreed to continue to prepare a Reef WQ Protection Plan after receiving the Reef Taskforce recommendations.
- A Scientific Review Panel was established to review available scientific information – including the Great Barrier Reef Catchment Water Quality Action Plan.

A Brief History Federal Government Initiatives

- **Nov 2000 - National Action Plan for Salinity and Water Quality** released

  3 GBR catchments – Burdekin, Fitzroy, Burnett

- **May 2001 – GBRMPA's GBR Water Quality: Current Issues** paper released - Summary of current research

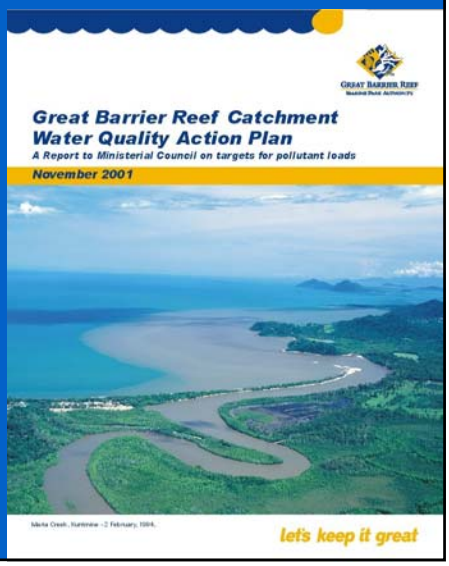
- June 2001 – GBR Ministerial Council directed the GBRMPA to develop an Action Plan to address the issue.

- **Nov 2001 –** Commonwealth Minister released **GBR Catchment Water Quality Action Plan**

Federal Government Action

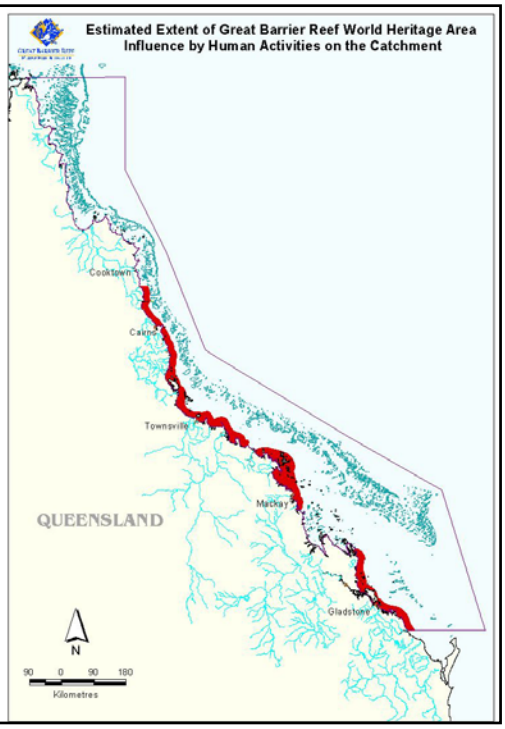
"Great Barrier Reef Catchment Water Quality Action Plan"

High	Med/High	Medium	Low
Barron Johnstone Herbert Proserpine O'Connell Pioneer Plane	Russell-Mulgrave Tully Murray Haughton Burdekin Don Fitzroy Calliope Baffle Kolan Burnett	Endeavour Daintree Mossman Black Ross Styx Boyne	Jacky -Jacky Olive Pascoe Stewart Annan Normanby Bloomfield Shoalwater Waterpark

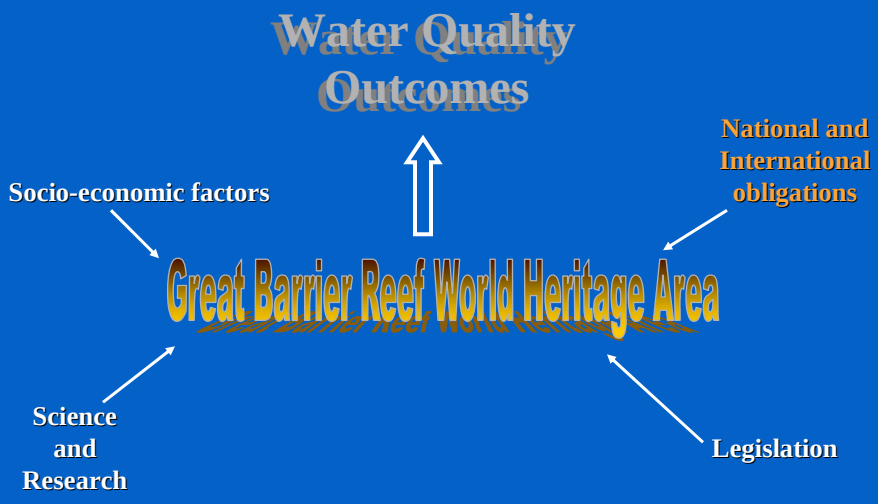


Estimated area of maximum risk from contaminated terrestrial runoff

Area contains 438 inshore reefs, 462 km² of seagrass beds and large estuarine areas



Factors affecting water quality management for the GBR



Reef Water Quality Protection Plan

- An inter-government memorandum of understanding (MOU) has was signed 13th August 2002 to underpin the co-operative approach between the Prime Minister and the Premier.
- The Qld Gov and the Commonwealth Gov joined in a partnership to develop a Reef WQ Protection Plan for the GBR.

A Brief History cont.

- **Jan 2003** – Qld Premier released **A Report on the Study of Land-Sourced Pollutants and their Impacts on Water Quality in and Adjacent to the GBR** – Scientific Review Panel
- **Feb 2003 – Industries, Land Use and Water Quality in the Great Barrier Reef Catchment** Final Productivity Commission Report released
- **May 2003** – Final Draft **Reef Water Quality Protection Plan** to be released for public comment

Productivity Commission Report
Major industries in GBR Catchment

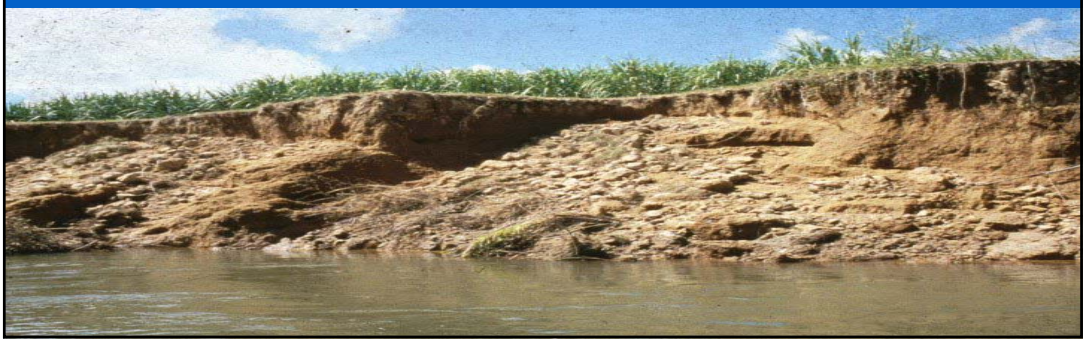
Industry	Gross Value ($m)	No. of people employed	Expected growth in output by 2020 (%)
Mining	7,052	10,380	- 2%
Tourism	4,269	47,660	51%
Mineral processing	1,392	3,918	36%
Beef	1,017	8,728	25%
Sugar cane	803	8,736	34%
Horticulture	708	9,006	Na
Recreational fishing	240	na	1%
Commercial fishing	119	641	-21%
Aquaculture	38	378	449%
	15,638	90,000 +	

Productivity Commission conclusion

- **No single solution will control diffuse pollution entering the GBR Catchment**
  - Various combinations of measures will be necessary. The most cost-effective measures include:
    - Provision of incentives
    - Removal of perverse incentives
    - Education and information
    - Targeted subsidies
  - The timing and sequence of measures is important

Science Panel findings - on land

- **Post - 1850: major land use practices have caused significant changes in river runoff**
  - accelerated erosion
  - greatly increased the delivery of sediment and nutrients over pre 1850 levels.



Science Panel findings – for the Reef

- Clear evidence of adverse impacts on inshore areas, and coral reefs up to 20 km from shore
- First indication of trouble is loss of "bounce back" capability (resilience to disturbance)

Not Visibly affected

Heath Reef, Princess Charlotte Bay

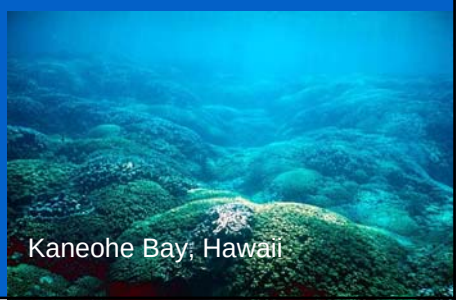
Visibly affected

Frankland Islands, Wet Tropics Coast

Science Panel findings
once damage is obvious it is too late

- Overseas experience shows that by the time wide-spread effects are obvious, the system would be almost irreparably damaged.

Eilat, Israel



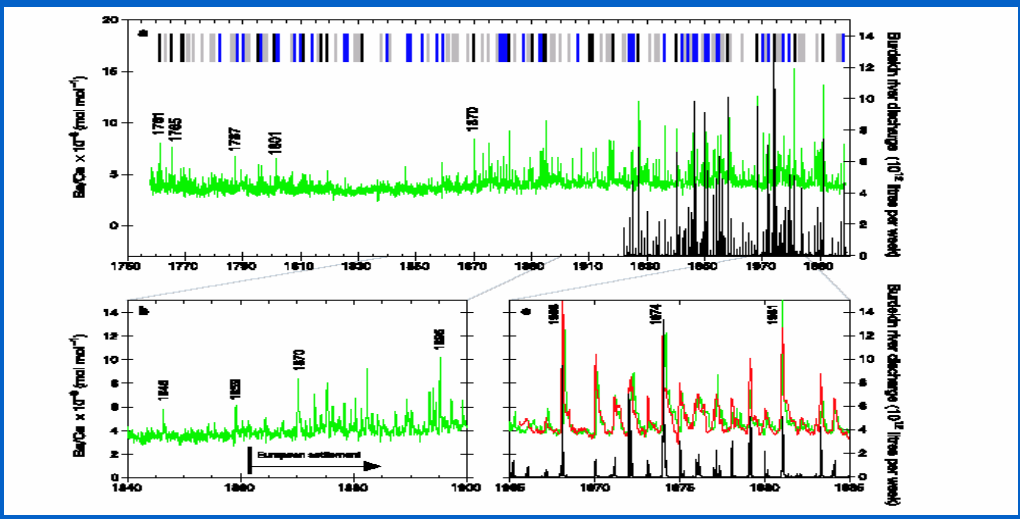
Kaneohe Bay, Hawaii

Science Panel conclusions

The Panel's findings confirm that in the best case:

1. **there is a serious risk to the long term future of the inshore Reef area from poor water quality;**
2. **that there is potential for damage to other interrelated parts of the Reef system; and**
3. **that action is necessary to avoid further damage and to allow affected areas to recover.**

Sediment delivery to reefs: Historical record in coral cores



McCulloch et al. 2003

Reef Water Quality Protection Plan

The Goal:

"Halting and reversing the decline in water quality entering the Reef"

Identify funding arrangements and political benefits for the partners.

Reef Water Quality Protection Plan

- Map areas of the GBR Catchment where high sediment and nutrient losses are occurring.
- Identify effective tools to reduce sediment/nutrient losses

Reef Water Quality Protection Plan

- Improve community awareness on the need to protect the reef. Stories and language
- No regrets package. For areas of strong resistance.

Reef Water Quality Protection Plan

The links with other planning processes:

- The Reef Plan is an overarching Plan aimed influencing existing planning schemes at a State, Regional and Local level by providing policy direction (Reef catchments)

Reef Water Quality Protection Plan

The Plan promotes a number of strategies to meet the objectives:

- Self management approached
- Extension and education programs
- Incentives for performance
- Better use of planning mechanisms
- Strengthening regulation

Reef Water Quality Protection Plan

Reporting and Auditing

Report to Prime Minister and Premier in 2005: will focus on whether satisfactory progress has been made and whether stronger action is required to achieve the goal of the Plan.

A second report will be made in 2010.

Recognising the need for urgent action.

Reef Water Quality Protection Plan

Main message:

The connection between land and sea is recognised in broad scale planning and policy processes and is also understood by the community at a local level.

Lessons Learned

- **Gather the best scientific information and aim at achieving an agreed position within the science community ie the issue the need for action and the time frame.**
- **Synthesis scientific information and convert the complex information into easy to understand stories.**
- **Science is only one of the tools to bring about change. Good communication, political support and public acceptance are extremely important.**
- **Involve the highest level of leadership as possible.**

Lessons Learned cont.

- Set specific and measurable goals.
- Where there is resistance to change start with ‘win/win’ or ‘no regret’ options.
- Openly engage the general public.
- Manage the timeframe of consultation carefully. The degree of consultation needs to be balanced against the timely need for substantive action.